Kinetics → The study of the rate of reactions

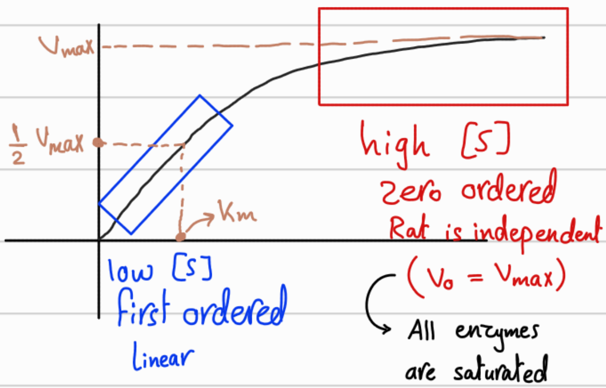
→ The change in the amount of reactant and Product per unit of time ($\frac{\Delta M}{time}$)

Reaction can be:

1) First ordered ⇝ ↑[S], ↑Rate (linear proportional) ⇝ Rate = K[S]
2) Zero ordered ⇝ Rate is independent on [S] ⇝ Rate = K

Enzyme catalyzed reaction:

→ curve is hyperbolic



Michaelis-Menten equation

V_o = initial velocity

V_{max} = The highest rate, when all enzymes are bound (saturated)

K_m = a constant indicates [S] when $V_o = \frac{1}{2} V_{max}$

→ $K_m = \frac{K_{-1} + K_2}{K_1}$

$$S + E \underset{K_{-1}}{\overset{K_1}{\rightleftharpoons}} ES \underset{K_2}{\overset{K_2}{\rightleftharpoons}} E + P$$

K_D = dissociation constant ⇝ accurate measure of affinity

→ $K_D = \frac{K_{-1}}{K_1}$

Both K_M, K_D are inversely Related with affinity

K_{cat} = Turn over number = the amount of substrate Converted to products per time per enzyme when saturated

Enzyme efficiency ⇝ depends on K_{cat} and V_{max}

→ $\frac{K_{cat}}{K_m}$

V_{max} and K_m are affected by:

1) Type of the reaction
2) Type of the enzyme

V_{max} is directly related to → The amount of enzyme

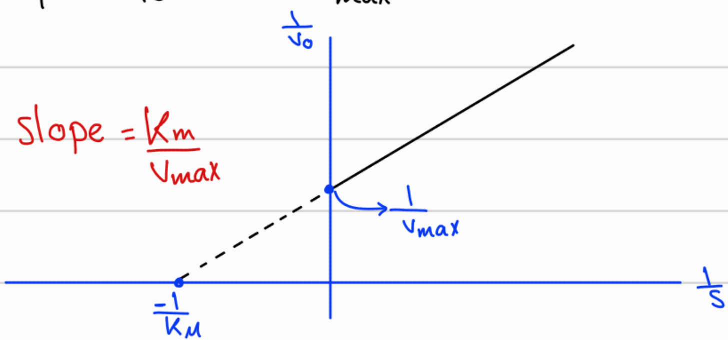
K_m is affected by → Type of the substrate

amount of substrate only affects the rate of first ordered reaction

Lineweaver-Burk equation

→ Double Reciprocal plot ⇝ linear curve

used due to the difficulty of using Michaelis and Menten equation, because very large amount of substrates are required to reach V_{max}



measure of enzyme purity and quality

Rate → Enzyme activity → Specific activity → Turn over number → Time → $\frac{1}{K_{cat}}$ [S]

$\frac{\Delta M}{time}$

$M/S = mol \cdot L^{-1} \cdot S^{-1}$

$\frac{\Delta mole}{time}$ = Rate X V

mol / S

$\frac{\text{Enzyme activity}}{Mass_E}$

$mol \cdot S^{-1} \cdot g^{-1}$

$k_{cat} = \frac{V_{max}}{[E]_T}$ = Specific activity X M.W

k_{cat} → k_2

[S^{-1}]